

time was spent under their sheltering roofs; and both were indefatigable in obtaining specimens for us, interpreting with the natives, and getting us the vernacular names. The latter were never recorded without severely testing their accuracy by examining several individuals.

Of the pleasant month we spent rambling amid the beautiful woods of Lifu, how we turned our good-natured friends' houses into "shambles," how we got shaken out of bed by earthquakes, &c. &c., are they not written in the pages of the 'Field' newspaper?

XX.—*Remarks on Dr. Gadow's Papers on the Digestive System of Birds.* By W. A. FORBES, B.A., F.L.S., Prosector to the Zoological Society of London.

DR. HANS GADOW, who is already known as a worker at the anatomy of birds from his papers in the 'Journal für Ornithologie,' has lately published in the 'Jenaische Zeitschrift' an elaborate article on the anatomy of the digestive organs of birds*. This paper, in two parts, extends over more than 140 pages, and is illustrated with nine plates.

In the first part Dr. Gadow gives a descriptive account (without histological details) of the alimentary canal and its appendages—tongue, liver, pancreas, cæca, &c., as well as of the kidneys, which he strangely includes with these organs—in the various orders of birds, in large part based upon his own investigations. I cannot always agree with Dr. Gadow in his grouping of the various forms together, as, *e. g.*, including such different forms as Auks, Penguins, and Grebes in the same order, "Pygopodes."

For this part of his work Dr. Gadow seems to have examined a large number of birds; but it is to be regretted that he has apparently had no opportunity of investigating some of the most interesting forms, such as the Tinamidæ and Turnicidæ. Had Dr. Gadow been acquainted with the structure

* "Versuch einer vergleichenden Anatomie des Verdauungs-systemes der Vögel," I. Theil, Jen. Zeitschr. f. Wissenschaft., Band xiii. Heft 1, pp. 92–171 (1879); II. Theil, *tom. cit.* Heft 3, p. 339 &c. (1879).

of the former group, he would not, I think, have insisted so strongly on the absolute isolation of the "Ratitæ" from all other living birds*.

Dr. Gadow justly regrets the small amount of attention that has been paid of late years to the anatomy of birds, and particularly, as he says, to the digestive system. But he seems to be unacquainted with the work done lately in this country by Prof. Garrod, as in the list of papers quoted by him but two of that anatomist's are mentioned. Hence no account is given of some of the most peculiar variations that are known to occur in the alimentary canal of birds, of, for instance, the peculiar proventriculus and cæca of *Chauna* (though Dr. Crisp's paper on this bird is quoted), and of the extraordinary stomachs of the species of *Plotus*. No allusion is made to the tongue of *Nestor*; and the old statements as to the universal absence of a gall-bladder, or, at all events, its only exceptional presence as an individual variety, in the Parrots and Pigeons, are repeated.

In the second part Dr. Gadow commences with the different forms of the same organs throughout the series of birds. In a tabular statement of the correlation of the nature of the cæca to the nature of the food, *Phœnicopterus* is included as one of the "Fleisch u. Fische" eaters. But, according to Mr. Salvin and other authorities, the major part of the food of these birds consists of the vegetable matter that grows at the bottom of the lagoons which they frequent (*vide* Dresser, B. of Eur. pts. 75, 76). The length and width of the alimentary canal, the relative size of its various parts, the influence of the food on the canal as a whole, and the variations in its length in birds of the same species, both young and old, are then discussed. The concluding part of the paper is devoted to a description of the disposition of the convolutions of the intestines; and this is decidedly the most novel part of Dr. Gadow's work, previous accounts of this subject being very meagre.

Excluding the Ratitæ, Dr. Gadow distinguishes three chief

* "Dass aber Uebergänge der 4 noch lebenden Ratitenfamilien unter einander und auch zu den Carinaten gänzlich fehlen," tom. cit. p. 107.

types of intestinal arrangement. These he calls *Orthocæla*, *Plagiocæla* (or *Plagiobrochi*), and *Cyclocæla*.

In the first group (*Orthocæla*), in which he includes the Pygopodes, Steganopodes, Anseres, Tubinares, Erodii, Alektorides, and Rallidæ, the chief folds, which are from five to eight in number, are straight and parallel to one another and to the long axis of the body.

In the *Plagiocæla*, which includes only the Rasores, the two middle of the four chief folds form more or less horseshoe-shaped loops at their extremities, and the general direction of the intestines always forms, more or less, an angle with the long axis of the body.

In the *Cyclocæla* one or more of the chief folds are spirally coiled round their ends. This division includes some of the Grallæ, the Pelargi, Laridæ, Psittaci, Raptores, Columbæ, the Coccygomorphæ and Pici in part, the Cypselomorphæ, and the Passeres.

It is further subdivided into the *Telogyri*, in which only the terminal part of the fold is coiled, and the *Hologyri*, in which the whole fold is so disposed, these latter, again, being further divided into *Progyri*, *Mesogyri*, *Amphigyri*, and *Polygyri*.

But, judging from the forms associated together under some of these heads, the groups so named are eminently artificial. Thus, the Raptores are divided amongst the first three, and under the *Mesogyri* are included forms as various as *Astur*, *Melieræx*, *Halcyon*, and *Phœnicopterus*.

The paper concludes with the inevitable phytogenetic table, showing Dr. Gadow's ideas of the lines of descent amongst birds. He holds that all the highest forms of each subdivision belong to the *Hologyri* or *Mesogyri*, the more primitive ones being *Orthocæla* or *Plagiocæla*.

The figures in the plates are chiefly devoted to showing, in a more or less diagrammatic way, the various types of intestinal convolution described in the text, and will be found very useful in elucidating Dr. Gadow's views.

In conclusion, it seems to me that, as it is a well-known fact that individuals of the same species vary, sometimes very

greatly, in the length of their intestines, the stowing away of a greater or less amount of gut in a given space, the abdominal cavity, becomes simply a mechanical problem, and therefore that there is less help in forming a sound view of the mutual affinities of birds to be derived from the facts in this direction described by Dr. Gadow than from many other points, more complicated, and therefore less easily altered, in the structure of birds.

XXI.—*Descriptions of two new Species of Parrots and a new Pigeon from South America.* By GEORGE N. LAWRENCE.

[Mr. Lawrence has sent examples of these species to us for examination; and we have appended a few notes.—EDD.]

CHRYSOTIS CÆLIGENA, sp. nov.

Front and lores of a dull yellowish orange; cheeks of rather a light sky-blue; feathers of the crown dull light yellow, ending with green; the feathers of the occiput and cervix are dark green, yellowish at base, and with the terminal edges blackish; back, wing-coverts, and upper tail-coverts dark green; tail-feathers dark green, all, except the two middle ones, having their ends for about an inch in extent of a dull pale yellow, with a wash of light orange-colour on the inner webs; the first primary is black, the others have their outer webs green for four fifths of their length, the terminal portions, with the inner webs, being black; the outer webs of the secondaries are green, with a speculum of bright orange-red, and terminating with deep indigo-blue, the inner webs are black; front edge of the wing with a wash of pale yellow; throat light green, with a wash of blue; breast and abdomen yellowish green, the feathers edged narrowly with blackish, on a side view the colour is bright verditer-green; upper mandible light horn-colour, with a reddish mark in front of the nostrils, the lower mandible is of a darker colour; feet blackish brown.

Length (of skin) about 13 inches, wing $8\frac{3}{4}$, tail 5, bill (along the curve) $1\frac{7}{8}$, middle toe and claw $2\frac{1}{4}$.

Hab. Guiana; Essequibo river.